**Some Economic Aspects of Yearling Sales**

***by Robert L. Losey and Avory Xu***

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***Introduction***

*This paper analyses two aspects of the economics of auction markets for Thoroughbred racing prospects. Data from the 2016 Keeneland September Yearling (one-year-old racing prospects) Sale is reviewed in analyzing 1) prices of colts vs. prices of fillies, and 2) effects of birthdate on prices.*

**Relative Prices of Colts vs. Fillies**

Though there are multiple factors that affect the prices of Thoroughbred yearlings, two factors are most important. Demand from buyers is based primarily on a yearling's potential returns as a racehorse (including the “psychic returns” owners receive from racing) and on the yearling's future residual value for breeding purposes.

**Returns from Racing**

Approximately half of racing prospects never win a race, but the earnings from those that do win can be substantial. [Arrogate, the leading all-time money winning Western hemisphere-based Thoroughbred, won $6 million of his total winnings of over $17 million while winning a single race, the 2017 Dubai World Cup.](https://www.bloodhorse.com/horse-racing/articles/220628/arrogate-last-to-first-in-dubai-world-cup) That Arrogate is a colt and not a filly is predictable. Rankings of North American Thoroughbred race-horse winners by dollars won on both the 2017 and the all-time leading sire lists suggest that likelihood. [As of August 14, nine out of ten of the leading earners of 2017 are colts, with Abel Tasman being the only filly](https://www.bloodhorse.com/horse-racing/thoroughbred-racing/leaders/leading-jockeys/2017). On the [all-time North American winnings list](http://www.horseraceinsider.com/Horse-Racing/top-50-thoroughbred-horses-all-time-leading-money-earners) you have to scroll down to Number 21 before finding a filly.

Multiple factors give colts an edge in accruing earnings. [A study at Windfields Farm](http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1349&context=animalscifacpub), a leading producer of quality runners in the last century, showed that colts tend to be bigger at birth and continued their size advantage as they grew. Because of their physical advantages, colts normally can run faster than fillies, and as a result [colts (or geldings) hold all of the track record times in North America for the traditional racing distances of 6, 7, 8, 9, 9 1/2, 10 and 12 furlongs](http://www.equibase.com/about/northamericanrecords.cfm) (A furlong is 1/8 of a mile).

Races in North America are typically partially segregated bysex, with a substantial percentage, probably just below 50%, of races limited to fillies and mares ("mares" are defined as female horses five years of age or older). The remainder of races are typically open to either sex, though fillies only infrequently venture into the open races. For instance, in the lead up to the Kentucky Derby over the last several years, no filly has made a concerted effort to compete in the preliminary races that qualify a horse for entry in the Kentucky Derby. Instead, their owners prefer to race in less competitive races restricted to fillies. This results in fillies earning less money because the purses for open races are higher than those for races restricted to fillies. The [Derby purse itself (just over $2 million) reinforces the earnings differential,](http://bleacherreport.com/articles/2708162-kentucky-derby-2017-purse-prize-money-payout-for-each-owner-horse-and-jockey) as the Kentucky Oaks, the comparable race for fillies, has a purse of only $1 million.

 The differences in purses earned by colts and fillies helps explain the higher average prices for colts, but the "Triple Crown factor" (or possibly it's the "Kentucky Derby factor") is also very important. Colts have won Triple Crown races much more frequently than fillies. In the over-100-year history of the Triple Crown races for three-year-olds (Derby, Preakness, and Belmont) there have only been three fillies who have won the Kentucky Derby, three who have won the Belmont, and five fillies who have won the Preakness.[[1]](#footnote-1)

**Residual Breeding Value**

The second important factor that drives demand for a yearling is the yearling's potential residual value as a breeding prospect. Buyers can sometimes breed horses and generate substantial income by selling the foals produced.[In the 2016 Keeneland Yearling Sale the highest price for a yearling was $3,000,000 and the average price was $97,000.](http://flex.keeneland.com/summaries/summaries.html)But the biology of breeding strongly biases the potential monetary returns from breeding. A mare averages having less than one foal a year (The gestation period averages 343 days), while 100 North American stallions bred 100 or more mares in 2016. These equine biological facts of life mean that there is little demand for the breeding services of all but the top 1/2 of 1% or so of colts. In contrast, approximately half of the 10,000 or so fillies that reach breeding age each year in North America are viable candidates to be bred.

 For both colts and fillies, the three factors that are paramount in breeders’ decisions to use them for breeding purposes are race record, pedigree, and physical conformation. But the standards for putting stallions into breeding service are much higher than those for using mares.

**Analyzing Data on Pricing of Colts and Fillies**

The Keeneland September Yearling Sale just outside Lexington, Ky typically grosses more than any other yearling sale in the world, typically cataloging more than 4000 yearlings. We broke down the Sept. 2016 Keeneland sale to see how colt and filly price differentials varied by segments of the sale. This sale had 13 daily sessions, and Keeneland staff organize the September sale so that the "best" yearlings are offered early in the sale, with the average quality of offerings declining each day after the early “super-select” daily sessions.

We first analyzed each of the thirteen sessions individually, finding that colts sold for higher average and median prices in all sessions. We then split the sales into three segments that approximated splitting the sale into thirds: select, mid-market, and the final third of the sale. Select included sessions 1 through 4, mid-market included sessions 5 through 8, and the final third included sessions 9 through 13. For each of the three segments, we calculated colt and filly averages and medians and reported them rounded to the nearest thousand. Our statistics appear below.

| **Average and Median Prices for Colts v. Fillies** |
| --- |
| Segment | Average ($) | Median ($) |
| Select Colts | 298,000 | 210,000 |
| Select Fillies | 233,000 | 180,000 |
| Mid-Market Colts | 90,000 | 66,000 |
| Mid-Market Fillies | 79,000 | 55,000 |
| Final-Third Colts | 24,000 | 12,000 |
| Final-Third Fillies | 18,000 | 10,000 |

| **Colt/Filly Price Ratios** |
| --- |
| Segment | C/F Ratios - Averages | C/F Ratios - Medians |
| Select | 1.28 | 1.17 |
| Mid-Market | 1.14 | 1.20 |
| Final Third | 1.33 | 1.30 |

As expected, averages price for colts were well above the average price of fillies in each of the three segments. The greatest difference between colt/filly averages was in the first (Select) segment. Perhaps the most plausible explanation is that buyers are willing to pay high prices for the colts in the select segment because they are not only the best racing prospects, but they also have the potential to be valuable stallions due to their high quality. Buyers understand that there is less than one chance in 200 that the average colt will ultimately become a sought-after stallions prospect. But the colts in the Select sessions are well above average, and have a much higher probability of becoming legitimate stallion prospects than average colts. Of those stallions that do start their breeding careers as popular prospects, only 10 to 15% of them will have at least modest commercial success. But the returns are extremely high for that small group that succeed and are in demand to breed over 100 mares each year. Moreover, a significant number of what turn out to failures in producing numbers of quality runners generated millions of dollars in stud fees before they proved themselves to be failures.

Because of their less fashionable pedigrees, colts from the middle Keeneland sessions have only modest potential to become valuable breeding prospects. Colts from the final third of the sale have next to no chance of becoming sought-after stallion prospects.

Fillies from the select sessions of the sale have substantial potential residual value even if they do not win a race because their pedigrees are outstanding, and also because, to a lesser extent, Keeneland tends to also sort offerings by physical characteristics. Thus fillies in the early sale sessions are more likely to have excellent physical characteristics (conformations) as well.

While only a few colts from the last third of the sale will ultimately have significant breeding potential, a filly from the final third of the sale often ultimately does have potential breeding value.  If she shows high class on the track (especially if she wins a stakes race) she will have significant value even if she has a modest pedigree. Remember that successful stallions often breed over 100 mares a year, hence the need (demand) for up to 100 times as many fillies in breeding operations per commercial stallion.

The results for the 2016 Keeneland September Yearling Sale are in line with historical results. Over the last fifty Keeneland September Sales, the average colt has sold for 1.27 times the average filly price, with the range varying from 1.57 to .88.  Hefty premiums for colts were paid in pre-recession years 2004-2006, when colts averaged 1.51 times filly averages.  The premium has been rangebound just below the fifty-year average of 1.27 from 2007 through 2016. Only four times in the last fifty years have fillies outsold colts, all in the “bubble” years from 1981 to 1986 when Keeneland yearling prices had tripled in ten years, with fillies more in favor as potential hedges against inflation following the inflationary 1970s.

Bloodstock Agent Bryan Foret has an interesting perspective with which many industry mavens would agree, arguing that “…chasing a dream is what the game is about, and the Kentucky Derby is a part of that dream for most buyers.”  Since its first running in 1875, only three fillies have won the Derby, and Foret argues that buyers like to play the “Derby lottery.”  Couple this with the fact that colts tend to mature earlier and run for higher purses, and you strong bases for higher prices for colts.  It’s true that a well-bred yearling filly often has residual value and thus is a safer investment than a similar colt because so few colts go to stud, though when colts go to stud their potential earnings are much greater.  As a financial proposition, colts are much more risky than fillies, but well-heeled buyers often seem to relish the greater risk they pose.

**Birthdates of Foal and Sales Prices**

Buyers of yearlings and other young foals take into account the birthdates of foals when considering what they are willing to pay. Foals born earlier in the year (*ceteris paribus*) are worth more than those born later in the same year because they will be more mature when they race. Since all foals have official birthdays of Jan. 1, and many races are restricted to two or three-year olds, a horse born in January competing against a born in May will often have an advantage because it has had four extra months to mature.

Thoroughbred racehorses are fully grown and generally reach their best abilities at ages 4-5 years. By age four an extra four months of maturity is unlikely to be very significant, but it can mean a big difference for young horses. And since the Triple Crown races targeted by many buyers are restricted to three-year-olds, the difference in maturity often affects prices buyers will pay. But there may be a partial counter-effect for January and Feb foals born in the northern half of the U.S. because they encounter cold weather as young foals.  Cold weather may slow growth rates and possibly contribute to illness.

We used 2016 September Sale data (See table below) to calculate the average prices for yearlings stratified by birthdate.

The first quintile represents the oldest 20% of yearlings sold, which, like the last quintile, averaged selling for 97.3% of their session averages. Yearlings from that first quintile were born as late as Feb. 14.

The most comprehensive study on yearling growth rates, a study done at Windfields Farm, reports that foals born April through June tended to have higher initial birth weights and heights and ultimately ended up being larger two-year-olds (with colts normally larger than fillies). More recent studies support the Windfields study. The pricing “sweet spot” at Keeneland 2016 was for foals born April 1 through April 25. Steve Johnson, master of Silver Springs Stud, suggests that research showing faster early weight gain for April/May/June foals is explained by their being born on the natural breeding cycle that synchronizes with nutritious pasture and less energy devoted to staying warm. May and June foals share environmental advantages with April foals, but sell for less because they’re playing an extreme game of “catching-up” physically relative to older foals.

The finding that the oldest foals sold for slightly less than foals born in the middle of the foaling season is contrary to what many observers would expect, which is that more mature older foals will sell for higher prices. The aforementioned environmental effect plays a role in that result. Additionally, our analysis of the Keeneland data finds that Keeneland tended to place a disproportionate number of early foals in the select portions of the sale. It is possible that Keeneland’s placement preferences overemphasized the supposed value of early birthdates and resulted in an overabundance of early birthdates in the select sessions of the sale that did not translate into higher prices.

**Keeneland Sept. 2016 Quintile Prices/Average Price**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DOB Quintile | 1st | 2nd | 3rd | 4th | 5th |
| % of Sale Average | 97.3 | 97.4 | 103.3 | 106.8 | 97.3 |
| DOB Last Date | 2-14 | 3-06 | 4-01 | 4-25 | 6-08 |

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1. Regret, Genuine Risk, and Winning Colors are filly winners of the Kentucky Derby, all in the last century. For more information, see https://www.kentuckyderby.com/uploads/wysiwyg/assets/uploads/Fillies\_\_Kentucky\_Derby\_\_2017\_.pdf [↑](#footnote-ref-1)